Patent Application of
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for

TITLE: EMBEDDED ELECTRONIC SEARCHING DEVICE FOR BOOKS

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority to the provisional patent
Application entitled "EMBEDDED ELECTRONIC SEARCHING DEVICE FOR BOOKS" filed
on 02/24/2003, Application Number 60/449,145

BACKGROUND OF THE INVENTION - FIELD OF THE INVENTION

This invention relates to electronic searching devices for books and other printed materials.

BACKGROUND OF THE INVENTION

Books and printed materials, such as magazines and newspapers, are commonly used means to publish and disseminate information.

In many cases, books may have thousands of pages, and contain significant amount of information. Examples of such voluminous books include catalogues, textbooks, encyclopedias, and yellow pages. Many professionals routinely deal with large books. Lawyers daily work with volumes of laws, legal regulations, and cases. Sales professionals work with catalogues of items for sale. College students use large, multiple-page textbooks.

The problem, which embodiments of this invention address, is searching a large book for a particular piece of information. Currently, this may be a very painful, time-consuming process.

The commonly used solution for this problem is the book index, which is commonly printed at the end of the book. The index contains a set of index keywords. For each keyword, it lists the set of pages, which contain this particular keyword.

The printed book index has many limitations.

First, it does not list all the words used in the book, only a subset of these words. This subset is often manually created by the author. If a particular word is not an index keyword, the reader has no means to search for this word.

Second, the index itself may have multiple pages, therefore, looking up the index for a particular keyword is a time consuming task.

As an example, "Intellectual Property in the New Technology Age" by Merges et al, Aspen Law, 2000, contains 1024 pages. From them, all the various indices, such as index of cases, index of statutes, and main index, take 24 pages. Searching such an extended index for a particular piece of information may be a very time consuming task.

Third, the index does not allow searches for word combinations, and logical constructions. Examples of such constructions include:

- Searching a legal case book for all year 1998 cases which are all related to patent protection
- Searching a recipe book for all recipes which contain milk and eggs, but do not contain flour
- Searching Yellow pages for all auto repair shops which are located on Green Street, and which repair breaks
- Searching a physics textbook for all discoveries made by US scientists

Embodiments of our invention solve these problems by embedding an electronic searching and indexing device into the book, and allowing arbitrary searches of book contents.

Fourth, the book indices are not standardized, each book has index in its own form, and some books do not have indices at all. The quality of the book index varies greatly from book to book. The reader must learn how to use the index for each particular book she has.

SUMMARY

In accordance with the present invention, an embedded electronic searching device is an electronic device, which is embedded into the book and enables search queries on the book contents, with results displayed to the user.

DRAWINGS - FIGURES

The attached figures are included for illustration purposes only and should not be construed to limit the possible embodiments of the invention in any way.

Fig 1 illustrates schematics of the device in one embodiment, top view, the front cover of a book according to one embodiment of the invention.

Fig 2 shows the main electronic components of the device according to one embodiment of the invention.

DETAILED DECRIPTION - FIG. 1A and 1B - ONE EMBODIMENT

One embodiment of the present invention is illustrated in
Figure 1 (top view of the book cover) and Figure 2 (main
electronic components of the device).

The device has a display **2**, which in one embodiment is
placed on the front cover of the book **1**. In one embodiment
the display **2** is a liquid crystal display (LCD) which is
commonly used in consumer devices.

The device has a system block **3**, which in one embodiment is
hidden in the front cover of the book. In one embodiment
the system block is placed between the two sheets of paper,
and glued in such a way, that it is not seen by the reader.
However, the system block may be placed in other places in
the book, such as the back cover, and may be seen by the
reader, and not hidden.

The system block device **3** in one embodiment consists of
electronic components that are necessary for device
operation, and the power supply. The detailed description
of the system block for one embodiment is given later in
this section.

The keyboard **4** is, in one embodiment, glued into the front
cover of the book. However, it may also be printed on the
front cover, or placed in any other reasonable way. The
keyboard **4**, in one embodiment, has buttons for English
letters from A to Z, digits from 1 to 10, a "Shift" button
which allows to enter capital letters, a "Backspace"
button, which allows to erase the last letter entered, a
"Cancel" button, which allows to cancel the current
operation, and a "Search" button, which allows to perform a
search on the book contents. However, the keyboard may have
other design.

Both the keyboard **4** and the display **2** are physically
connected to the system block **3**. In one embodiment the
connectors are electric cables, which are glued into the
book's front cover. However, one may use any other kind of
connectors, as soon as they support sending electronic
signals to the display, and receiving key strokes from the
keyboard.

The system block **3**, in one embodiment, has non-volatile memory **9**. The non-volatile memory **9** stores the book's index. The book's index, in one embodiment, for each word used in the book lists the pages on which this word has occurred, and number of occurrences of this word. However, the index may store any other information about the contents of the book, such as the number of chapters, the size of each chapter, the title of each chapter, etc.

In one embodiment, the non-volatile memory also contains the software, necessary for device operation, namely the device initialization software, which is run on boot up, and the search software, which performs a search on the index, given a search query.
However, the non-volatile memory may contain any other software and data necessary for device operation, such as utilities for book marking particular pages, adding notes etc.

In one embodiment, the non-volatile memory is flash Read Only Memory (ROM) commonly used in consumer electronics. However, the non-volatile memory may be any other kind of non-volatile memory.

The system block **3** has volatile memory **10**. In one embodiment we use common Random Access Memory (RAM) used in computers and consumer devices. However, the volatile memory may be any other kind of memory which allows read and write operations, such as flash memory.
The volatile memory holds the data and variables related to the current search and other data and variables used by device software.

The Central Processing Unit (CPU) **7** is a processor, which runs the search software and computes the search results.

The power supply **10** is, in one embodiment, a common electric battery used in consumer devices. However, the power source may be any other source of electric power, such as a solar battery.

In one embodiment embodiment, the memory, CPU, and the power supply are plugged into an electronic board **11**, and form the system block **3**. However, the aforementioned electronic components **7, 8, 9, 10** may be assembled and

connected in other way, and using any other additional electronic elements.

DETAILED DECRIPTION - Operation

In a typical usage scenario and in one embodiment, the operation of the device consists of the following steps:

1. The user types in a search query using the keyboard. As an example, let us assume that the reader want to search a cook book for all recipes that contain milk, eggs and flour. In this case the reader will type

   "milk eggs flour"

2. The device will search the search index, and output all the pages that match the query. In the particular example, the device will find all pages that contain the three words milk, eggs and flour, and the output on the display will look in the following way: "Search results: Pages 12, 34, 56"

   The user may then look up the corresponding pages.

In an advanced usage scenario, the query may contain logical operators AND, OR and NOT.
As an example, if the reader is interested in all recipes, which contain eggs, milk, but no meat, the reader may type a query:

   "eggs AND milk NOT meat".

In this example, the device will perform a search, an output all book pages, which contain eggs and milk, but do not contain meat.

The device may output other information for each search result, such as chapter number, chapter name, etc.

The device may support bookmarking pages and making notes. The user may be able to bookmark a particular search result for fast retrieval in the future. The user may also be able to use device to leave notes related to book contents.

The device may be attached to the book using means which allow detachment and then reattachment. As an example in one embodiment it can be attached to the book using Velcro-like fastener.

Accordingly, several objects and advantages of the present invention are:

a) We empower the book's reader with a simple, small, and inexpensive electronic searching device which is embedded into the book. When mass produced, the device may have dimensions of a credit card, and the price of an inexpensive calculator. For user convenience, the device may be embedded or glued into the book's front cover, or added to the book in any other convenient way.

b) The reader does not have to read the book's index to search for a particular piece of information. Instead, the reader types a search query using the device keyboard, which may be embedded or printed on the front cover of the book. As a response to the query, a list of page numbers for matching pages is displayed on the device's display.

c) The user may have queries with multiple words and logical expressions. As an example, to search yellow pages for all auto repair shops on Green Street, which repair breaks, the reader would type

"auto repair breaks Green Street"

d) Using modern electronic technology the device may be in a very small size (credit card size), and may actually take less space, then the printed index.

e) The device will have a standardized interface. This means, that if the reader has many books, she has to learn using the search device only once.